

What is claimed is:

- 1 1. A method comprising:
2 modeling an audio-visual observation of a subject
3 using a coupled Markov model to obtain an audio-visual
4 model;
5 modeling a portion of the subject using an embedded
6 Markov model to obtain a portion model; and
7 determining first and second likelihoods of
8 identification based on the audio-visual model and the
9 portion model.
- 1 2. The method of claim 1, wherein modeling the
2 audio-visual observation comprises using a coupled hidden
3 Markov model.
- 1 3. The method of claim 2, wherein the coupled hidden
2 Markov model comprises a two-channel model, each channel
3 having observation nodes coupled to backbone nodes via
4 mixture nodes.
- 1 4. The method of claim 1, further comprising
2 combining the first and second likelihoods of
3 identification.

1 5. The method of claim 4, further comprising
2 weighting the first and second likelihoods of
3 identification.

1 6. The method of claim 1, wherein the portion of the
2 subject comprises a mouth portion.

1 7. A method comprising:
2 recognizing a face of a subject from first entries in
3 a database;
4 recognizing audio-visual speech of the subject from
5 second entries in the database; and
6 identifying the subject based on recognizing the face
7 and recognizing the audio-visual speech.

1 8. The method of claim 7, further comprising
2 providing the subject access to a restricted area after
3 identifying the subject.

1 9. The method of claim 7, wherein recognizing the
2 face comprises modeling an image including the face using
3 an embedded hidden Markov model.

1 10. The method of claim 9, further comprising
2 obtaining observation vectors from a sampling window of the
3 image.

1 11. The method of claim 10, wherein the observation
2 vectors comprise discrete cosine transform coefficients.

1 12. The method of claim 7, wherein recognizing the
2 face comprises performing a Viterbi decoding algorithm.

1 13. The method of claim 7, wherein recognizing the
2 audio-visual speech further comprises detecting and
3 tracking a mouth region using vector machine classifiers.

1 14. The method of claim 7, wherein recognizing the
2 audio-visual speech comprises modeling an image and an
3 audio sample using a coupled hidden Markov model.

1 15. The method of claim 7, further comprising
2 combining results of recognizing the face and recognizing
3 the audio-visual speech pattern according to a
4 predetermined weighting to identify the subject.

1 16. A system comprising:
2 at least one capture device to capture audio-visual
3 information from a subject;
4 a first storage device coupled to the at least one
5 capture device to store code to enable the system to
6 recognize a face of the subject from first entries in a

7 database, recognize audio-visual speech of the subject from
8 second entries in the database, and identify the subject
9 based on the face and the audio-visual speech; and
10 a processor coupled to the first storage to execute
11 the code.

1 17. The system of claim 16, wherein the database is
2 stored in the first storage device.

1 18. The system of claim 17, further comprising code
2 that if executed enables the system to model an image
3 including the face using an embedded hidden Markov model.

1 19. The system of claim 16, further comprising code
2 that if executed enables the system to model an image and
3 an audio sample using a coupled hidden Markov model.

1 20. An article comprising a machine-readable storage
2 medium containing instructions that if executed enable a
3 system to:

4 recognize a face of a subject from first entries in a
5 database;

6 recognize audio-visual speech of the subject from
7 second entries in the database; and

8 identify the subject based on recognizing the face and
9 recognizing the audio-visual speech.

1 21. The article of claim 20, further comprising
2 instructions that if executed enable the system to provide
3 the subject access to a restricted area after the subject
4 is identified.

1 22. The article of claim 20, further comprising
2 instructions that if executed enable the system to model an
3 image including the face using an embedded hidden Markov
4 model.

1 23. The article of claim 20, further comprising
2 instructions that if executed enable the system to model an
3 image and an audio sample using a coupled hidden Markov
4 model.